VIA pc-1 Community Solutions

An Intrepid Approach to Emerging Market Education

Enabling the Next One Billion

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Introduction

Education is an inalienable right and fundamental to economic growth and sustainability in developing nations. It empowers individuals with an understanding of their own history and of foreign cultures, promotes new skill sets to improve employment opportunities, and helps to break the culture of poverty that marginalizes individuals and results in feelings of helplessness. According to the World Bank, the widening education gap between wealthy and poor countries explains why 4.8 billion people, who live in developing and transition economies, receive only 20 percent of the global GDP. Continuous education, the World Bank further suggests, is crucial to create a solid intellectual and economic foundation that acquires and uses hi-tech knowledge and skills to boost economic growth[1].

ICT (Information and Communication Technology) is an essential tool to create this solid intellectual and economic foundation, and to develop the skill sets required for today's global economy. Regardless of race, gender or class, access to ICT motivates communities to break the poverty cycle through learning and sharing history & knowledge. However, conditions in developing nations are preventing the adoption of traditional computing technologies: people simply do not have the disposable income to spend on computers; nor is their local infrastructure well disposed to support ICT, with intermittent and expensive power supply and poor transportation facilities to remote regions combining with excessive heat, dust and other pollutants.

Bringing ICT to developing nations and communities, therefore, requires a bold, fresh approach that extends computing beyond the traditional PC usage model. As part of its comprehensive global strategic VIA pc-1 Initiative aimed at enabling the next one billion users, VIA has designed innovative community solutions that include power efficient server/client and PC technologies to deliver essential tools to facilitate education, develop new skill sets, and enable individuals to learn and share their history. Combining system and application flexibility & affordability with industry leading low power consumption, a media rich feature set and rugged chassis, VIA pc-1 Community Solutions can be installed in just about any environment and can be powered by non-traditional sources such as solar energy.

To showcase this innovative approach to solving the difficulties of deploying ICT in developing regions, VIA has donated a complete VIA pc-1 Community Solution to the Thai Nguyen University of Agriculture and Forestry (TUAF) to create a community information and learning center in the poorer Northern Mountainous Area of Vietnam.

In addition to outlining the VIA pc-1 Community Solution deployed, this document will describe how it addresses the needs of students and users of the learning center and overcomes the challenges of deploying ICT in developing nations.

[1] The World Bank feature story: Bridging the 'Knowledge Divide' through Education, October 9 2002

Bringing ICT to Northern Vietnam

The Northern Mountainous Area (NMA) of Vietnam comprises 16 provinces with 35 ethnic minority groups, and accounts for 34% of the entire country's area. Thai Nguyen is located in the heart of this region, north of the capital Hanoi, and is an ideal location to demonstrate how VIA pc-1 Community Solutions can be used to improve education and help break the culture of poverty.

The northern region of Vietnam

Known as a key regional center for government, economy and culture that contributes significantly to national socio-economic development and national defense and security, this region has a high portion of disadvantaged youth, reflected by youth unemployment and other indicators such as the number that sit the university entrance exam, just 15%. Disadvantaged youth in this region can benefit from ICT to overcome a number of social and economic challenges by:

- Improving opportunities to access education and training, and to participate in recreational activities
- Facilitating knowledge transfer to improve the quality of education
- Improving their self-confidence through skill-building and raising their employment prospects
- Improving the allocation of resources such as local municipal expenditure to provide services such as education and training

Teaming up with Cornell University in the USA on the ICT for Development (ICT4D) program, TUAF hopes to extend the benefits of ICT beyond the walls of the university to the local community. The establishment of a digital facility within TUAF can leverage the college's extensive knowledge of local education and content requirements, enabling it to better outreach to target groups within the community and support for the learning effort to best advance local development. It is hoped that an intelligent ICT program that takes advantage of the university's strategic resources can be used as a template for similar ICT adoption programs in other universities in Vietnam and beyond.

The VIA pc-1 ICT Center

Under a program initiated by the APEC Digital Opportunity Center group, VIA and TUAF have set up an ICT/computer technology facility, called the VIA pc-1 ICT Center, at TUAF, to service TUAF students and disadvantaged youth of the NMA with the benefits of ICT. The Center shall provide:

- Training on how to use information technology to access government and non-government resources such as those related to employment opportunities and benefit programs
- Training in information technology and internships for the communication center to give sufficient experience to gain employment in Vietnam's expanding information technology industry
- Youth-oriented information and entertainment via media and the Internet from both the government and private sector to build good citizenship and reduce young people's sense of isolation from mainstream Vietnamese society
- Increased access for university students to subject materials and distance education programs
- Readily accessible family welfare related materials to strengthen the family unit[2]

In addition, the Center will survey the information and communication needs of the disadvantaged youth who have experienced both social and physical isolation.

The future site of the VIA pc-1 ICT Center

Content made available to students and disadvantaged youth using of the community centers will be tailored to local social, linguistic, and cultural characteristics by Thai Nguyen University. Where possible, applications will be media rich and address the objectives set out.

As a pilot program in the region, the VIA pc-1 ICT Center will pioneer the approach on how ICT can be used to enhance student education, break the culture of poverty experienced by disadvantaged youth and improve employment opportunities with a long term goal of stimulating economic growth in the region.

[2] Source: Building Vietnam Universities's capacity to support information and communication technologies for development (ICT4D)

Location-Specific Requirements


Air-conditioning is not available in the center

Deploying ICT to the mountainous region has a number of unique challenges that similar deployments in developed countries do not have. In Hanoi, for example, the average temperature during summer is between 30C and 40C, with humidity ranging from 75% to 85%. When technology is deployed in this type of sub-tropical climate, especially when no air conditioning is available, as is the case with the VIA pc-1 ICT Center, it must be able to cope with the high operating temperatures and level of humidity that can cause premature failure of computer components. With access to qualified personnel, diagnostic tools and replacement technology in Thai Nguyen limited, it is essential that technology used in the VIA pc-1 ICT Center offer rock-solid reliability.

Technology that generates little heat is also essential in emerging market deployments. Power efficient computers with low power consumption considerably reduce temperature increases through ICT operation, making the classroom environment more comfortable to work in and reducing the need for room air-conditioning that can be expensive to install, operate and maintain. In the case of the Thai Nguyen VIA pc-1 ICT Center, there are only ceiling fans for cooling, underlining the importance of low heat-producing computers.

The supply of power and its consumption is a major issue that must be addressed by technology, not just in regional areas of Vietnam but in all emerging markets. In Thai Nguyen, intermittent mains supply of power causes power loss, as many as five times within a three-hour period. Moreover, the region has a cost per kilowatt hour that, when indexed to the wages of a rural Vietnamese worker, is over forty times that of the United States. Technology deployed to operate in this region must address these power challenges. Consuming over two thirds less power compared to traditional desktop PCs, VIA pc-1 Power Saving PCs are an example of technology overcoming these challenges and creating a sustainable model of operation to significantly lower the cost of operation in emerging markets.

Requirements of Technology for the VIA pc-1 ICT Center
• Ability to withstand temperatures of up to 40C and humidity levels as high as 85%
• Low power consumption to reduce the cost of operation and make possible, if required, viable alternate energy solutions
• Able to handle the computational requirements of the Center's users
• Low maintenance requirement

VIA pc-1 Community Solutions

VIA, through the VIA pc-1 Initiative, has developed complete platform solutions that address the unique requirements of emerging market deployments. Combining ultra low power consumption and cool operation with system ruggedness to withstand the effects of environment extremes, VIA pc-1 systems have low maintenance requirements, and a low cost of deployment and operation that makes possible an unprecedented low total cost per seat, when compared to traditional computer technologies. Data security is also made available through the VIA PadLock Security Engine, a set of security primitives that strengthens security of information stored and exchanged, as well as providing protection against viruses and worms.

VIA pc-1 Community Solutions use a balance of server/client computing with stand-alone desktop computers to address the diverse needs of emerging market communities. Combining a VIA pc-1 server based on cool running VIA Eden processors with VIA pc-1 Power Saving Clients and VIA pc-1 Power Saving PCs, VIA pc-1 Community Solutions can be configured to facilitate easy central access to information and services, as well as providing a flexible infrastructure for applications such as classroom based teaching and individual learning.

At the VIA pc-1 ICT Center in Thai Nguyen, the VIA pc-1 Community Solution will balance the region's unique hardware requirements with the functional needs of the Center. The VIA pc-1 PCs can be utilized by students and disadvantaged youth alike to create their own multimedia content. VIA pc-1 server/client network solutions also make possible a shared access model of operation, where many users can use any VIA pc-1 Client in the center to access their personal information and work on projects or assignments. The server/client infrastructure also facilitates ICT based teaching for students and disadvantaged youth.

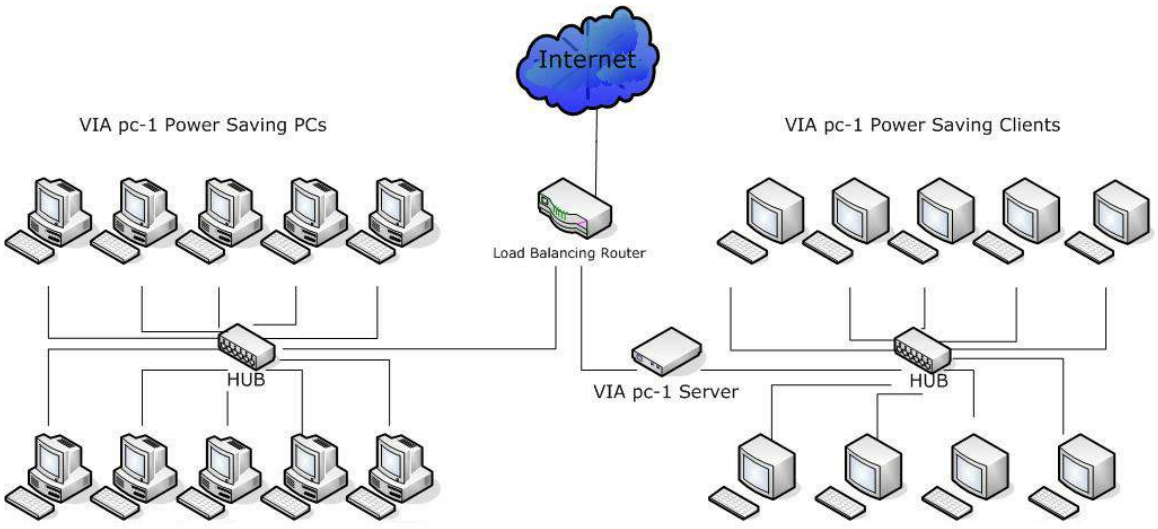

Figure 1: Configuration of the VIA pc-1 ICT Center

VIA pc-1 Community Solutions: System Benefits

To successfully deploy, operate and maintain technology in the Northern Mountainous Area of Vietnam, a number challenges must be overcome to create a sustainable model of operation. These challenges include the cost and supply of power, the extreme environmental conditions of the area and how to reduce the total cost of ownership to be financially feasible. VIA pc-1 Community Solutions help overcome these challenges to create a sustainable model of operation with industry leading ultra low power consumption, rich integration and a low cost per seat.

Ultra Low Power Consumption

The VIA Power Saving PC and VIA pc-1 PHD Client are based on energy efficient VIA processors, and complementary ultra low power VIA chipsets that reduce power consumption by over two thirds when compared to a standard desktop PC. This significant reduction in power consumption lowers the cost of powering the VIA pc-1 ICT Center deployment of nineteen VIA pc-1 systems to less than USD14 per month, which compared to a deployment in the same region of nineteen standard desktop PCs saves over USD24 per month – the equivalent of over 80% of an unskilled rural Vietnamese workers monthly salary. When these savings are indexed to the minimum wage in the United States, this would mean a reduction in cost of operation of almost USD 1000 per month.

Lower Cost per Seat

Cool operation and low power consumption also help to reduce the cooling and power infrastructure requirements of the VIA pc-1 ICT Center. Using systems designed to operate in extreme conditions, VIA pc-1 Community Solutions can be deployed in regions that require alternate power sources and/or do not have sufficient cooling. This is particularly important in the VIA pc-1 ICT Center, where air conditioning is not available to withstand the high humidity and temperatures of the region and there is only limited access to a constant supply of basic power.

When the solution's ruggedness is combined with the affordable price of VIA pc-1 technology, the VIA pc-1 Community Solution offers a significantly lower deployment and operational cost per seat than other desktop PC based solutions.

	Deployment cost + cost of power over three years	Cost per Seat		
		Year 1	Year 2	Year 3
VIA pc-1 ICT Center Community Solution	USD 8205	USD 413	USD 8	USD 8
Equivalent deployment of traditional PCs	USD 11195	USD 539	USD 25	USD 25

26% in savings over 3 years or the equivalent of **almost eight years** of a Vietnamese rural workers wage

Table 1: Deployment and operation costs of a complete classroom of 19 computers

Flexibility

Combining server/client computing with stand alone PCs, VIA pc-1 Community Solutions deliver the right mix of functionality, performance and affordability to enable a rich user experience and create a sustainable model of operation that overcomes the challenges of deployment in emerging markets. Students in the TUAF VIA pc-1 ICT Center can, for example, leverage the flexibility of technology available to be fully productive from any workstation. Using the VIA Power Saving PCs, students can run applications and store data locally, as well as use CD & DVD based multimedia to complement their education. The VIA pc-1 server and VIA pc-1 Power Saving Clients facilitate efficient central operation and storage to enable students to work and access content from any terminal to enhance their studies.

Security

Using a combination of server/clients with standalone PCs, VIA pc-1 Community Solutions also strengthen security and resistance to attacks, as well as facilitating easier maintainability of the network. Administrators can set the VIA pc-1 Server to be the entry point of the network enabling them to prevent potential misuse and propagation of worms and viruses to client and stand-alone PCs. The built-in hardware security of the VIA PadLock Security Engine can be utilized by the VIA pc-1 server to strengthen a firewall, create virtual private networks with other ICT centers to ensure secure communication for inter-university communication and distance education, as well as, give assurance to disadvantaged youth who learn to use the VIA pc-1 ICT Center to trade local goods and services online.

When used in conjunction with VIA pc-1 PHD Clients, the VIA pc-1 Server also makes possible secure storage of important and confidential information. Students, for example, can securely store assignments and research data centrally on the server and use any VIA pc-1 PHD Client in the VIA pc-1 ICT Center to access and work on their information. Disadvantaged youth too, who learn to become local entrepreneurs can use the server/client infrastructure to trade from any VIA pc-1 PHD Client in the VIA pc-1 ICT Center and securely store data and customer information on the server.

Maintainability

Employing the VIA pc-1 Server as a central access point in the VIA pc-1 ICT Center further enhances the solution's ease of maintainability. Technicians, for example, in city centers such as Hanoi, can use remote administration to log into the VIA pc-1 ICT network and fix any problem without the need to go on-site. Furthermore, PCs or clients that fail in the center can be replaced locally and setup remotely via the VIA pc-1 Server, reducing the cost of maintenance. A server/client infrastructure also helps to simplify maintenance by preventing users to store data locally on their computer. To store data, users must create a private account on the VIA pc-1 Server, which enables administrators to easily maintain user accounts from one central location. This simplified approach to computing, combined with its inherent lower infrastructure requirements facilitates VIA pc-1 Community Solutions to create a sustainable operation in the most remote Emerging market region.

Rich Integration

VIA Power Saving PCs and Clients integrate a rich suite of hardware based media, security and bandwidth efficiency technologies to offer a feature packed solution in an ultra compact form factor. These technologies include:

VIA UniChrome IGP Graphics

Optimized for the Hi-Def™ experience, the VIA UniChrome IGP graphics core uses the Chromotion CE display engine with hardware MPEG-2 acceleration to offer exceptionally smooth video playback and streaming of various digital video formats. The VIA UniChrome IGP graphics core makes possible the use of media rich content and video conferencing to educate disadvantaged youth with information and entertainment.

VIA Vinyl Multi-channel Audio Suite

VIA pc-1 systems integrate the high-performance VIA Vinyl Multi-channel Audio Suite for superlative 6-channel immersion audio support, and incorporates the VIA Vinyl AC'97 controller to enable six-channel audio and the transfer of the highest resolution audio possible over the AC'97 standard.

VIA 8X V-Link Technology

Designed to set new standards of system efficiency, VIA 8X V-Link technology optimizes information transported between the VIA Northbridge and Southbridge chipsets to ensure that the VIA pc-1 systems deliver a hassle-free, smooth operating experience.

VIA PadLock Security Engine

Integrated into most of the VIA pc-1 processor range is the world's most advanced native x86 security, the VIA PadLock Security Engine. When enabled, VIA PadLock offers military-grade protection of information stored and exchanged making possible secure connections that can thwart attempts by hackers to gain access to information on the PC, as well as assure local entrepreneurs that their financial and customer data is well protected.

Rich integration of technology also makes possible smaller system footprints; the ultra compact Mini-ITX form factor mainboard measures just 17cmx17cm, and reduces in-field maintenance caused by component incompatibility and instability. VIA pc-1 systems are also compatible with Microsoft® Windows® and Linux operating systems, and offer full driver support to facilitate deployment in any location, especially in regions that have unique localization requirements.

VIA pc-1 Community Solutions: System Architecture

Based on the ultra power efficient VIA pc-1 processor platforms, VIA pc-1 Community Solutions comprise a blend of stand-alone desktop PCs and a networked server/client set-up that can be configured to meet the requirements of a variety of emerging market applications.

VIA Power Saving PC

Combining an energy efficient VIA processor with a fully integrated video processing feature set that includes a 2D/3D graphics engine and ultra efficient VIA DDR memory controller, the VIA Power Saving PC is designed for high quality digital video streaming and digital video playback. The system also facilitates seamless connectivity with the innovative VIA 8X V-Link technology and 10/100 Ethernet to improve bandwidth efficiency and 6-channel surround sound to give a rich audio experience.

Integrated into each VIA Power Saving PC is a high capacity hard drive for local storage and DVD-ROM or CD-ROM to run disc based multimedia content. When integrated into the VIA pc-1 Community Solution, the VIA Power Saving PC enables students to run applications and store data locally, enhancing their learning experience and complementing the shared access model made possible with the server/client infrastructure. As part of the VIA pc-1 ICT Center, ten VIA Power Saving PCs are deployed at TUAF.

VIA pc-1 Server/Client Configuration

To enhance the benefits of the VIA Power Saving PC, VIA pc-1 Community Solutions integrate a powerful server/client configuration that makes possible central storage and access to applications, the Internet and user data, as well as facilitating an efficient infrastructure to teach classes and employ distance education programs. Powered by an energy efficient VIA processor, nine VIA pc-1 PHD Clients are deployed as part of the VIA pc-1 ICT Center in Vietnam and use a dual VIA processor based VIA pc-1 server to host applications, store data and control access and content for users.

VIA pc-1 Server

Based on dual-processor Mini-ITX mainboards, the VIA pc-1 Server combines an ultra-compact form factor with efficient dual processing to create a server solution based on a 1U design that delivers services, applications and data to a number of clients efficiently and securely. Altogether, the server has four VIA Eden 1GHz processors, all with the integrated VIA PadLock

Security Engine available to handle the computational requirements of the clients and offer protection against hackers, viruses and worms.

Extolling the same power and cool operation benefits of VIA Power Saving PC, the VIA pc-1 Server draws less than 90 watts of power and, depending on the operating environment, can run fanless.

VIA pc-1 Power Saving Client

Designed to optimize performance and connectivity between the VIA pc-1 Server, VIA pc-1 Power Saving Clients are based on an energy efficient VIA processor, and together with the distributed performance of a media rich VIA chipset, leverage the same hardware strengths of the VIA Power Saving PC to offer a smooth user experience through a server/client configuration. Using the VIA pc-1 Client to connect to a server and process centrally stored applications and data, the server/client configuration in the VIA pc-1 Center enables students to access information from any client workstation with the same look and feel of a VIA Power Saving PC, without a local hard drive. Based on shared access model, this server/client configuration offers flexible operation and a secure infrastructure to protect student data, as well as help ensure that students always have access to ICT. Within this VIA pc-1 Community Solution, VIA pc-1 Clients are used in conjunction with a VIA pc-1 Server to create a secure central and manageable server/client configuration that can be remotely updated and maintained to be used by both students and disadvantaged youth.

Consuming less than 30 watts, VIA pc-1 Clients set new standards for energy efficiency and have a fanless design to ensure a sustainable deployment in extreme environments.

Conclusion

Through deployments like the VIA pc-1 ICT Center in Thai Nguyen, VIA is demonstrating how sustainable and highly flexible community ICT solutions, which combine ultra low power consumption and cool operation with rich levels of feature integration, can be used to increase access to ICT, improve employment opportunities for students, and help educate the region's disadvantaged youth in ICT to further their training and help break the poverty cycle. Using stand alone VIA Power Saving PCs with secure VIA pc-1 PHD Clients and a VIA pc-1 Server, the VIA pc-1 ICT Center is a pilot program in the region that demonstrates how VIA is leading the industry by using a combination of energy efficient technologies designed to operate in developing regions, to improve the quality of education and stimulate economic growth in the region.